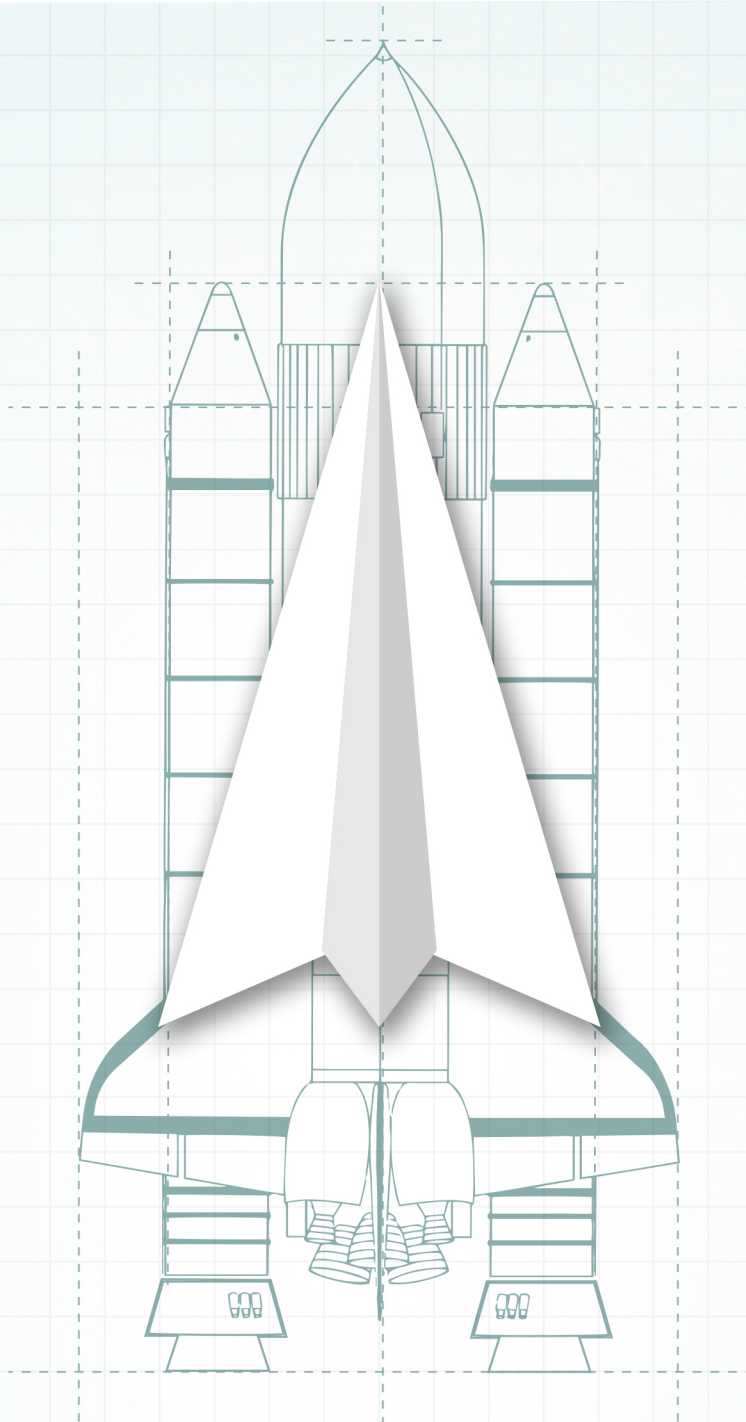




THE FUTURE

OF SUPPLY CHAIN MANAGEMENT

SIMPLE, RIGHT?

IF ONLY.

While digital technologies are revolutionizing the worlds of procurement and supply chain management, decision-makers can't just push a magic button and, *voilà*, their supply chains are automatically modernized, digitized and perfectly aligned to meet their strategic business initiatives.

The reality is digital supply chain transformation is a journey. No doubt, you feel pressure to move quickly, whatever your role—whether you are in IT, supply chain management, corporate management, procurement, manufacturing, line-of-business management or elsewhere.

And, in certain areas, it makes sense to move quickly and boldly, particularly when it comes to investing in technologies such as cloud computing, big data analytics, social networking, artificial intelligence, mobility, robotics, the Internet of Things and the like.

But you must also move forward strategically. That means looking at digital supply chain transformation as a long-term strategy that will impact every aspect of your business, from technologies and processes to personnel, governance, partners, security, finance, tariffs and regulatory compliance.

What does that long-term vision look like? Each industry and each company will have its own specific set of answers, but there are also common elements that will define what successful, innovative supply chain management looks like in the future. These elements are likely to include:

- **A data-driven model** that puts data at the center of the business in an integrated manner that eliminates silos and seamlessly connects all systems, including direct and indirect procurement, ERP, manufacturing, distribution, sales and any other interrelated activity. The goal is to harness the power of all your data wherever it is located at any time and any place.
- **A unified management platform** that is software-based, leveraging the cloud to maximize agility and minimize complexity. With a cloud platform, you can not only scale far more easily but also consume innovation at a much faster pace to constantly and dynamically improve security, performance and customer engagement.
- **A highly automated architecture** that leverages advanced technologies such as AI, the IoT, machine learning, big data analytics, robotics, 3D printing and blockchain to accelerate processes, minimize risk and take advantage of real-time insight to make the best decisions for the business, its partners and its customers.

How do you get there from here? How do you ensure that the technology investments and partners you choose today will help accelerate and simplify the journey to an innovative and modern enterprise supply chain management system of tomorrow?

That's where this e-book comes in. It is designed to be a thought-provoking guide to digitally transforming your supply chain and therefore digitally transforming your business. We explore how digital technologies are revolutionizing supply chain management and what types of innovations organizations are experiencing now and will experience into the future.

The e-book also looks at critical underlying trends and technologies that are driving supply chain transformation, including cloud computing, artificial intelligence, mobility, IT consumerization, automation, the Internet of Things, robotics and other digital age advances. Finally, we take a peek at what the future supply chain will look like and how your organization can make the right decisions now to smooth its journey along the way.

Let's get started.

TABLE OF CONTENTS

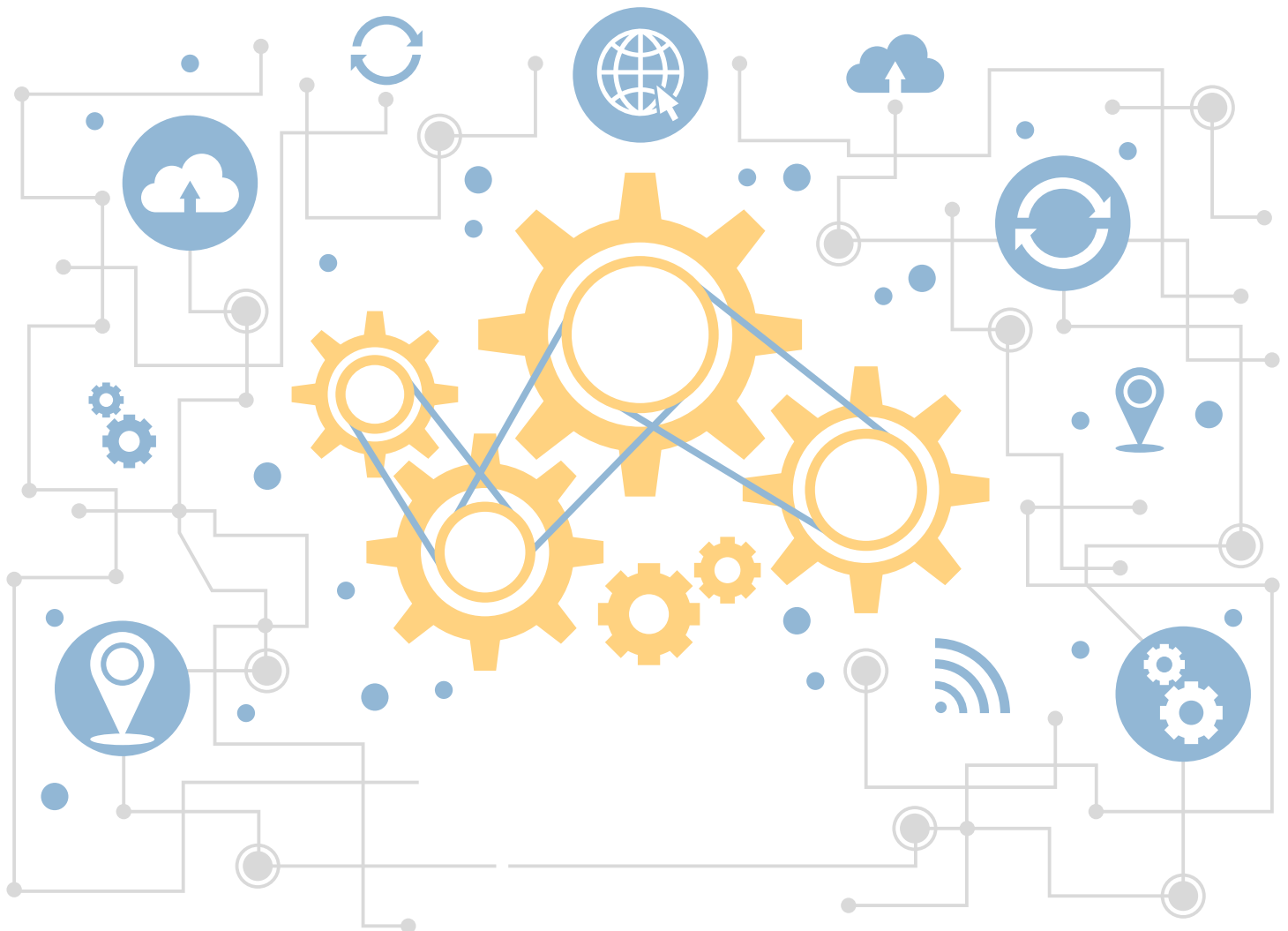
Chapter 1: All Digital, All the Time

Chapter 2: Technology that Drives Innovation

Chapter 3: Unifying the Entire Supply Chain

Chapter 4: Moving Forward

Chapter 5: Conclusion



CHAPTER 1: ALL DIGITAL, ALL THE TIME

The world has changed dramatically over the past five years, let alone in the couple of decades since the birth of what we now think of as digitally enabled supply chain management, first embodied in enterprise resource planning (ERP) systems that date back to the 1990s.

The original concept of ERP systems was to tie together all of the processes within an enterprise that were related to doing business—getting the order, fulfilling the order, getting paid for the order, recording the payment, and so on. It was all about the execution of processes, not about strategy, planning or leveraging data to make the business more competitive and innovative.

Planning was left to separate solutions, all of which resided outside the ERP box. These solutions were designed to consume enterprise data, such as the history of shipments, history of orders, customer tracking and pricing, so the organization could use that data to decide what to do next.

Decisions about pricing, inventory, manufacturing investment and other critical business factors were typically based on what the company had done in the past and then making future projections based on that history. It was a company-first approach, “inside out” in the sense that the company’s viewpoint was to make decisions based on what was going on *inside the company*, rather than what was going on outside in the market.

A New Era . . .

Obviously, times have changed. An inside-out, company-first approach to enterprise resource planning and supply chain management in today’s environment is a sure path to failure.

We are in a world in which the amount of data being created is already staggering and growing exponentially. As we have seen time and time again, companies that are able to harness that data and use it to drive innovation have been able to disrupt decades-old business models in an incredibly short period of time.

At the beginning of this century, less than 20 years ago, companies like Tower Records, Borders and Blockbuster

Entertainment were giants in their fields, household brand names that seemed invincible. Google barely had any revenue. Facebook, Airbnb and Uber were still years away from even being launched. We know how that picture turned out.

Given the pace of technological innovation, digital transformation, globalization, consumerization and other inexorable trends, can any business leader take the chance that the next five or 10 years won’t be equally disruptive?

. . . Driven by Data

In today’s environment, the key to being successful, remaining successful and unlocking innovation is in harnessing the power of data and infusing that data into every aspect of your supply chain.

In order to put your organization in a position to harness data and make the right decisions about where to invest in people, processes and technologies, it is worth taking a quick, high-level view to explore five key trends that are driving this necessity.

Trend No. 1: Data growth. IDC predicts the “Global Datasphere” will grow from 33 zettabytes in 2018 to 175 zettabytes by 2025.¹ As the report notes, “The focus of this digitization is anything and everything that intersects our business workflows and personal streams of life.” Sounds like a pretty good description of a supply chain. It is important to understand that it’s not just about the volume of data—it is also about the variety and velocity. Data is now generated everywhere across internal supply chains and beyond. This means the IoT, sensors everywhere, social media, mobile apps, and more—all of which are generating and feeding constant, dynamic streams of data from all over the world in a variety of flavors, formats and functions. Just getting a handle on all that data requires new approaches to data management, as being able to manipulate, leverage, analyze and harness that data for competitive advantage is the pathway to the future.

Trend 2: Digital transformation. The future is digital transformation. It doesn’t matter what industry or type of business you’re in or what your business models look like now. If you do not embrace digital transformation, you run the risk of being disrupted. By 2022, more than 60% of global GDP will be digitized, according to

¹ “The Digitization of the World from Edge to Core,” IDC white paper sponsored by Seagate, November 2018

IDC, “with every industry driven by digitally enhanced offerings, operations and relationships.” By 2023, 75% of all IT spending will be on technologies to support digital transformation, with more than 90% of enterprises building “digital-native IT environments to thrive in the digital economy.”²

Trend 3: “Exponential” technology innovation. We are entering an era defined by “exponential” technologies. This means we are beginning to use technologies that exponentially create data—data creating more data, creating more data, ad infinitum. Artificial intelligence, machine learning and the IoT are examples of this. Gartner predicts that there will be 20 billion Internet-connected things by 2020.³ By the end of the next decade, futurists predict that number will be in the trillions. IDC predicts 40% of digital transformation initiatives will use AI services this year. These are just a couple of examples. Additional innovations that are driving transformation include cloud, blockchain, automation, robotics, 3D printing, machine learning and others. We will discuss these in greater detail in the next chapter.

Trend 4: IT consumerization. The workplace is changing dramatically, as are the expectations of customers, consumers, business partners and anyone else touched or shaped by digital transformation. According to research by Google, 53% of mobile website visitors leave a web page if it doesn’t load in three seconds. That was in 2016.⁴ Do you think consumers are more patient now? IT consumerization means that everyone is now considered a customer, even employees or partners. It also means that the expectations individuals have in the consumer world are extended to all of their relationships, including business-to-business. For organizations in all industries, this means immediate gratification, the use of real-time analytics, highly accelerated development cycles, increased automation, ubiquitous mobility and any other tool at their disposal to deliver a highly consumerized, simple, fast and hassle-free online experience to everyone—and, increasingly, *everything*—within the supply chain.

Trend 5: Business globalization. We are in a new era of globalization driven by digital connectivity. On the one hand, this opens up huge opportunities for organizations of any size. In today’s environment, any company can use the Internet to reach potential customers anywhere in the world and easily become an exporter by joining

e-commerce marketplaces. Even the largest global companies can take advantage of digital platforms and tools to reduce costs, consolidate operations, operate more efficiently and reach new customers in new markets. On the other hand, globalization creates challenges in managing the digital supply chain, including issues around cybersecurity, compliance, data sovereignty and dealing with local laws and regulations wherever you do business. Globalization, in combination with digitization, is creating a need for organizations to re-examine how they are organizing, managing and deploying their supply chains. They must decide: Is there a better way forward?

Evolving from Inside Out to Outside In

The answer to the last question is simple: Yes, there is a better way forward. If you look at where we started this chapter, many companies are still stuck in that “inside out” paradigm when it comes to their systems for ERP and supply chain management.

It is true that these systems have evolved and the vendors behind them have made attempts to embrace cloud and other modernization initiatives. But the reality is that they are fundamentally not designed to deliver the kind of unified, data-centric approach to business transformation that is not only available today but fundamentally required to be successful now and into the future.

Organizations across all industries need a new model. They need to easily leverage technology, automation and modern business processes. They need to take advantage of real-time analytics, intelligence and insight. They need to facilitate the shift to an “outside in” model. The old ways of doing things won’t work anymore. It is time to evolve to a unified platform model that synchronizes all data and activities across the entire supply chain.

How can you make that happen in your organization?

Read on.

² “IDC FutureScape: Worldwide IT Industry 2019 Predictions,” IDC, October 2018

³ “Leading the IoT: Gartner Insights on How to Lead in a Connected World,” Gartner, 2017

⁴ “Why Performance Matters,” Google Web Fundamentals, Feb. 12, 2019

CHAPTER 2: TECHNOLOGY THAT DRIVES INNOVATION

Consider the following scenarios:

Scenario No. 1: In an operating room in a midsize hospital in the Midwest U.S., a patient is in for a hip replacement. Under the old supply chain model, the orthopedic surgeon would have three different sizes of a titanium prosthesis. The challenge with a hip replacement is that the surgeon doesn't really know which size will fit best until the patient is actually on the operating table. The physician may try one, realize it is not the right size and then try another—or maybe even two more before getting the size he wants to use. This can lead to waste because once a prosthesis is opened, it can't be used again. Under the new supply chain model, the physician doesn't have any prostheses on hand. Instead, he has a 3D printer using advanced imaging and design software. Once he has opened up the patient, he puts the exact specifications into a computer and critical parts of the prosthesis are created on site, to the specific size requirements needed for the patient. This leads to better outcomes for the patient and more efficiency for the physician and the company supplying the prosthesis.

Scenario No. 2: A retail company wants to add a new supplier that has introduced a product that dozens of potential customers have requested through social media, on the website and at various brick-and-mortar locations. The retailer has never done business with this supplier before, but both the retailer and supplier utilize blockchain technology. The retailer reaches out to the supplier using its blockchain address and creates a smart contract. This states the terms of the agreement, including pricing, timing, quantity and so on. The smart contract is verified by each node on the blockchain, and once approved, the appropriate payments are transferred from one blockchain account to the other. With the wheels now in motion, the payment is processed and the product is delivered—and the supplier and retailer may have never had a single conversation or correspondence. The entire smart contract process, including payments, has been fully automated, with the execution of the conditions at each stage recorded against the contract and fully visible to the onward chain.

Welcome to the supply chain of the future. Or, shall we say, the digital supply chain of the future, where every aspect of the supply chain is both digital and

connected to every other aspect of the supply chain. The scenarios above illustrate the power of two relatively new technologies, 3D printing and blockchain.

But those technologies represent just a piece of a much broader picture of technology innovation. In reality, the supply chain of the future will be activated by a range of technologies that are coming together to deliver capabilities that would have seemed like science fiction as recently as 10 or 15 years ago.

These technologies include cloud computing, machine learning, AI, big data analytics, robotics, automation, the IoT and the aforementioned 3D printing and blockchain. Underlying these technologies are IT innovations in virtualization, all-flash storage, object storage, network fabrics and others that have made cloud computing possible and brought a new generation of supply chain management systems within reach.

The Focus on Data Quality

One of the important threads that ties all of these technologies together is the basic foundation upon which they rely. That is the data and, more specifically, the quality of the data. Look at machine learning and artificial intelligence as examples of two technologies that are helping to revolutionize the supply chain.

These technologies are only as good as the quality of the data that underlies their intelligence. As IT professionals often say, "garbage in, garbage out." If the data being fed into your machine learning and AI software is inaccurate, misleading, biased, old or not based on a trusted source of data, the underlying assumptions driving your supply chain analytics could lead you in the wrong direction.

So, the first steps to take now is to focus on data management and ensure the quality of the data you are using throughout your supply chain. This applies to all of the disparate platforms you are planning to connect—your existing ERP system, your systems for direct and indirect procurement, as well as anything else that drives the business, from human resources to sales to logistics.

The Technology Foundation

While you are focusing on the quality of the underlying data, it is also time to explore and invest in the foundational IT technologies that are enabling and empowering this revolution in supply chain.

Without getting too deep into the technical weeds of some of the underlying IT technologies—such as the OLTP databases, object storage systems, virtualization and network fabrics—here is a checklist and brief overviews of some of the critical technologies and capabilities that organizations will need to breathe life into the data-driven digital supply chain of the future:

- **3D printing** to drive dramatic savings in materials costs, productivity and manufacturing—not just for prototypes but for actual production models.
- **Analytics** based on “big data” and “little data” from all available sources, whether from within or outside the company (such as social media), to enable real-time decision-making and leverage visibility to drive immediate actions.
- **Artificial intelligence** to go beyond what the data tells us so that the machines are doing data exploration that may have never been considered, creating new business opportunities, enabling fast response to advanced cybersecurity threats and enhancing the experiences of customers wherever they are and whoever they may be.
- **Automation** to simplify and accelerate supply chain processes at all stages, eliminating risk of human error, enabling data insights to be used far more strategically, supporting zero-defect security processes, accelerating regulatory compliance and achieving new levels of productivity across the board.
- **Blockchain** to add new levels of transparency, security, simplicity and automation to a wide range of supply chain processes—including smart contracts, currency exchange, tracking and payment.
- **Cloud computing** to leverage an infrastructure that brings new levels of agility, scalability and potential cost savings to the supply chain, whether the cloud is public, private or hybrid, and whether it is used for the entire supply chain or just specific aspects of it.
- **Cybersecurity** to ensure that transactions are safe and secure, that customer privacy is maintained, regulatory and sovereignty requirements are adhered to, and people throughout the supply chain—employees, customers and partners—feel safe doing business with your organization.
- **Internet of Things** to take advantage of the billions-going-on-trillions of sensors that can provide invaluable real-time information, giving you levels of insight and visibility into your supply chain beyond what anyone has been able to achieve in the past.
- **Machine learning** to use large data sets and advanced algorithms to find new patterns and analytics that can lead to major cost reductions, improvements in productivity and reduced risk of downtime. Insights from machine learning can help to improve inventory management, sales, marketing, logistics and other specific business operations within the supply chain.
- **Mobility** to put people and things where they can deliver the best results for your bottom line, while ensuring that the customer experience is a positive one that matches or exceeds the heightened “consumerized” expectations of the modern world.
- **Robotics** to automate, simplify, accelerate and reduce the risk of error in a broad range of activities but particularly in order fulfillment, manufacturing, distribution and other logistics. As robots get smarter with machine learning and AI, they will deliver ever-more-powerful efficiencies and cost savings across the digital supply chain of the future.

And One More

Admittedly, there is one vital element missing from this checklist. That is the software that pulls it all together. To truly unify the digital supply chain, you need a platform that lets you seamlessly integrate and centrally manage the various disparate systems that need to be connected.

This would be a platform that connects ERP, production, human resources, direct procurement, indirect procurement, finance, logistics and whatever else it takes to run a business smoothly, efficiently and strategically. A *unified* platform that lets you leverage data wherever and whenever you need it, with real-time visibility infused with intelligence and insight.

How can you take that next step and build a true data-driven digital platform for your supply chain of the future? And why should you?

Read on.

CHAPTER 3: UNIFYING THE ENTIRE SUPPLY CHAIN

Data insights and technology advances are great, but they aren't enough. To truly take advantage of the data and technologies at your disposal, you must ensure that everything is connected. Even if you have sophisticated technology infrastructure, if your data is siloed and not leveraged across the organization, you won't maximize your investment. In fact, you will more likely risk falling behind your competition.

In Chapter 1, we talked about the old inside-out model of supply chain, wherein decisions were driven by what was happening—more accurately, what had happened—from inside the company. In today's highly consumerized, data-driven world, this model is obsolete. To be truly innovative now, organizations must take an outside-in approach to their supply chains, focused on analytics and insights from the real world.

The Supply Chain as an Endless Digital Loop

An important way to think about an outside-in supply chain is not as a chain at all but as an endless, continuous loop of data that is always in motion, always spreading vital information wherever it is needed. The term supply chain at one time was aptly descriptive. There was, indeed, a sequential chain of events from materials to manufacturing, distribution, sales and post-sales.

The future of the supply chain is not linear, not sequential, but more like a system of veins and arteries that feeds blood and oxygen to keep the body healthy and alive. In this reconception, the supply chain isn't a chain—it's a nexus and its blood and oxygen are data. And not just data that enables marketing of a product or service but a range of other activities, such as:

- Using the market to inform how, when, where and why the product is developed.
- How the product is sold, marketed and billed.
- How it is accounted for in the financial systems.
- How commissions are paid.
- How market conditions and expectations are impacting the next iteration of the product—and the one beyond that and then beyond that.

The opportunity is to always be cognizant of what is going on in the market, so you are using real-time information, analytics and insight to drive planning and execution. Data is rampant in volume and variety, whether it is used for procurement, analytics, marketing, sales or any other function. The goal of the supply “nexus” is to ensure these critical capabilities:

- 1. Providing real-time or near-real-time visibility.** In business terms, where are my delivery trucks now, and how can I ensure they are on the fastest route? How is the patient doing in the hospital, and what type of medication will she need and when? How is our 10% discount working in the Northeast, and what will happen if we increase it to 30% for the next hour? How is the use of robotics in our Dublin distribution center reducing shipping costs and accelerating deliveries to our partners in Europe?
- 2. Harnessing the data.** There is a huge advantage in being able to go beyond visualizing what is going on now, to a place where the system can also use intelligence and analytics to predict what will happen in the future. Then, the organization can put in algorithms to consume what is happening in the real world and make appropriate changes on the execution side. This is the path to a supply chain that leverages real-time optimization to process, predict and figure out what to do and, potentially, automatically make it happen.
- 3. Connecting everything.** Today, most organizations have an amalgam of separate systems, many of which do similar functions but are not necessarily connected to one another in an integrated or seamless manner. Silos are the enemy of the supply chain of the future. They make everything more difficult: leveraging big data analytics, developing new solutions, achieving visibility across functions, meeting corporate compliance requirements, managing cybersecurity.

We asked earlier: How do you get there from here? How do you go from siloed, disconnected systems for ERP, production, direct procurement, indirect procurement and other functions to the data-driven digital supply chain of the future? How do you ensure real-time visibility, with the ability to harness your data and unify your operations?

Like so many business endeavors these days, particularly when it comes to information technology,

the transformation from the supply chain of the present to the supply chain of the future is a journey involving a number of essential stages.

Please turn to the next chapter to learn what steps you can take now and where you can safely invest in people, processes and technologies to make sure that your organization is on the right track.



CHAPTER 4: MOVING FORWARD

It would be nice if we could report that every aspect of the supply chain of the future is available for immediate off-the-shelf consumption, so you could just flip a switch and be there. Nice, but, of course, not very realistic.

As we have said, transforming from the linear and siloed supply chain of the past and present to the unified, interconnected, data-driven digital supply chain of the future is a process and a journey.

But, like any journey, it has to start somewhere.

An important place to start is to review what you have in place, what is currently working for you and what you can build upon to move forward. It is also important to look for vendors that can articulate a clear vision for the supply chain of the future and aren't trying to lock you into legacy ERP systems that can't offer the kind of seamless, cross-disciplinary integration that you will need.

One important vendor characteristic to look for is a "platform" approach to the supply chain, offering a centralized view and unified management software that can eliminate silos and bring all aspects of the supply chain under one virtual roof. With this approach, you won't have to necessarily move away from the legacy systems you are now using for ERP or HR—you can simply use integration tools to link them together and provide both vision and actionable insights across the supply chain.

In addition to talking to vendors that offer both a vision and a platform for the supply chain of the future, it is also important to begin developing knowledge, expertise and experience with the new technologies that will be critical to your next-generation supply chain.

For example, there may be specific areas of the business where your teams would feel safe in experimenting with blockchain, with the express idea of learning more and becoming comfortable expanding usage to other

departments or lines of business. The same goes for any of the other technologies highlighted in Chapter 3 of this e-book.

Action Points

Depending upon your role in the organization, there are additional positive steps you can take now to improve supply chain activities with the goal of transitioning to a more integrated, seamless model in the future.

- **Move more workloads to cloud models, whether public, private or hybrid.** Cloud will give you new levels of agility and scalability, but cloud also requires experience. Your first foray into the cloud will need adjustments, but that is fine because the agility of the cloud makes adjusting simple. The sooner you get started, the better.
- **Eliminate silos.** As mentioned earlier, silos are the enemy of the supply chain of the future. If critical aspects of your supply chain are siloed off from the rest of the supply chain—either by data, applications or workloads—you won't achieve the type of seamless integration that will enable you to truly leverage your data.
- **Focus on data quality and analytics.** Remember, garbage in, garbage out. If the supply chain of the future is built on a platform of digitally connected data, your analytics, insights and success will be only as good as the foundation of data upon which they are built.
- **Don't forget cybersecurity and compliance.** With everything connected, cybersecurity becomes a more critical issue because it gives adversaries a much broader attack surface, exacerbated by more "things" on the network. Increased globalization also makes compliance a greater challenge because different regions and industries have their own requirements for data privacy and data sovereignty, to name two important variables.
- **Get more mobile.** Everyone and everything are more mobile. Within the supply chain, mobility allows you to be more agile in tracking resources and putting people and things where they can deliver the most value. From a customer perspective, the unfettered ability to interact with your organization at any time, from any place, using any device is simply the cost of doing business in today's world.

Finally, it is critical to embrace IoT, AI and other innovations. The supply chain of the future must be more automated, more integrated, more intelligent and more efficient than anything any of us may have imagined when this decade began. The expansion of technology has been incredible in recent years, and we are only now entering the world of “exponential” technologies. Organizations that leverage these technologies to modernize and future-proof their supply chains will be the ones that succeed and create disruption in the years ahead.



CHAPTER 5: CONCLUSION

Time and technology wait for no one.

In today's world, transformation seems to be a constant theme, whether it is digital transformation, workplace transformation or, as we have seen here, supply chain transformation. Technology innovation forces organizations to move quickly because if they don't, a competitor or a group of competitors will. Then the risk becomes disruption rather than transformation.

Fortunately, today's decision-makers, whether in IT, procurement, corporate management or elsewhere within the supply chain ecosystem, can chart a path to the supply chain of the future. Starting now, they can invest in people, processes, technologies and partners to help ensure that their journey enables them to evolve to reach the parameters set throughout this e-book, including:

- Evolving to a data-driven digital supply chain that improves productivity, strengthens the bottom line and transforms business models.
- Leveraging data, analytics, AI, the IoT, automation and other modern tools to drive creativity, collaboration and innovation.
- Seamlessly integrating disparate business operations, activities and logistics into a seamless whole that will make it easy and exciting for the business to continue to grow and evolve.

Can you get there from here? With the right solutions, partners and vision, there is nothing stopping you.

ABOUT OUR SPONSOR

This TechTarget e-book on “The Future of Supply Chain Management” is proudly sponsored by GEP, a global leader in digital procurement and supply chain solutions. GEP helps global enterprises operate more efficiently and effectively, gain competitive advantage, boost profitability and maximize business and shareholder value.

Fresh thinking, innovative products, unrivaled domain and subject expertise, and smart, passionate people—this is how GEP creates and delivers unified supply chain solutions of unprecedented scale, power and effectiveness. With 18 offices and operations centers in Europe, Asia and the Americas, GEP helps enterprises worldwide realize their strategic, operational and financial objectives.

To learn more about GEP's comprehensive range of strategic and managed services, please visit www.gep.com. For more about SMART by GEP®, the cloud-native, unified procurement and supply chain platform, please visit www.smartbygep.com.